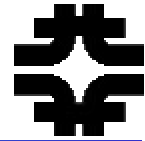# D0 Trigger Workshop

- **Goals**
  - **Educate the collaboration on the status and capabilities of the D0 trigger system**
    - **Tutorials on simulation and database**
  - **Plan for the implementation of new triggering capabilities, especially tracking. Involve the physics and ID groups in exploiting the new triggers and verifying the performance of the filters.**
    - **Presentations + discussion tomorrow by ID groups**
  - **Understand priorities for trigger commissioning and the interaction between various trigger elements.**
  - **Identify integration areas which need to be covered as L1, 2 and 3 groups consolidate into the D0 trigger.**

Ronald Lipton
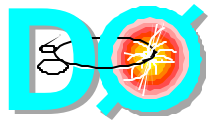
Schedule
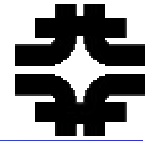
- **Cal L1**
  - **|calorimeter eta| < 1.6 ~ April 25**
  - **|calorimeter eta| < 2.4 ~ May 16**
- **L1 CTT**
  - **Hardware in place ~ March 22**
  - **Tracks -> L1 mu, single sector ~ May 1**
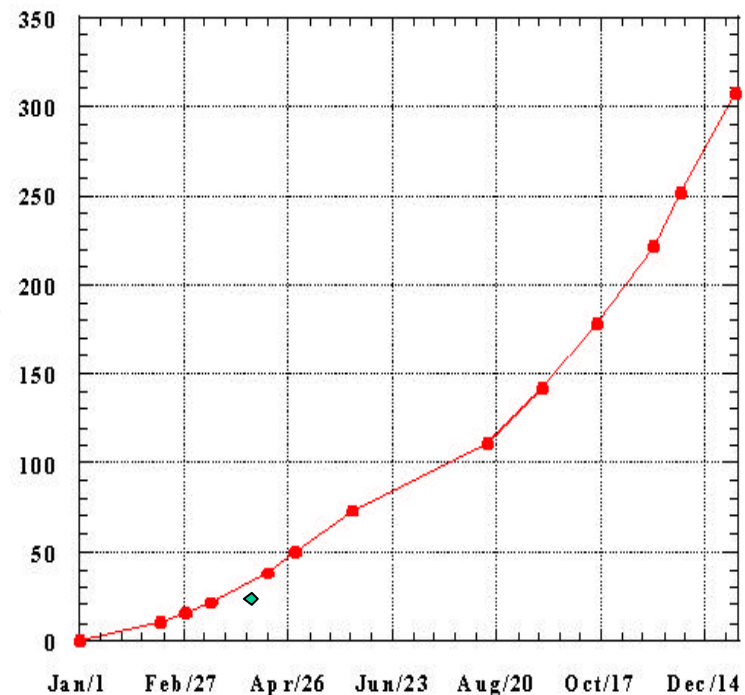- **L2**
  - **Running with prescale "filters" ~ April 3**
  - **Physics rejection ~ April 17**
- **L2 STT**
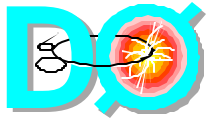 - **Data from CTT ~ May 15**
- **L3**
  - **Software infrastructure ~ April 1**
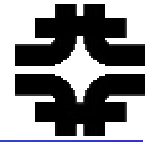 - **All SBCs in ~ May 15?**
- **Many things happening in quick succession – individual schedules *will* be delayed by "outside" constraints**
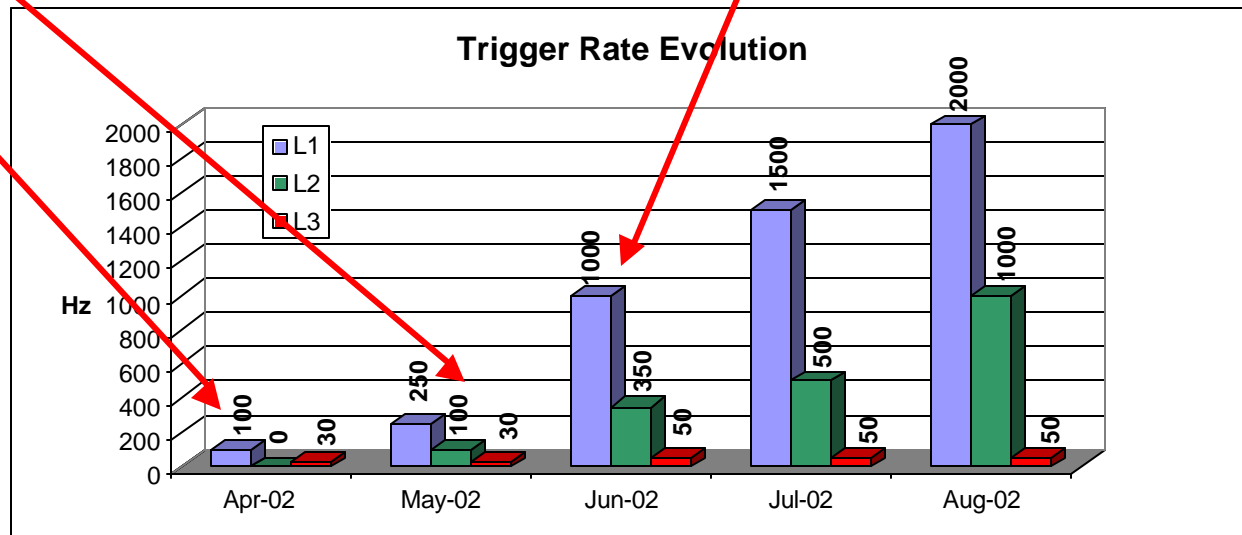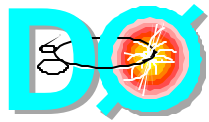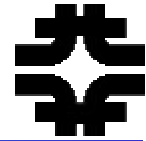
2002 luminosity plan

Rates

- **Current Limitations**
  - **Multibuffering – limits overall rate to L2 due to L2 latency ~100 Hz**
  - **VRC bandwidth limits 100-250 Hz. SBCs will increase readout rate capability from front ends to L3 ~ 1.5Khz – beyond what is needed**
  - **Muon MFC – FEB increases when rate goes above ~400 Hz (new MFCs)**
  - **L2 rate limited to 2000 Hz until L2 beta is available**

Trigger Rate Evolution

Legend: L1, L2, L3

Hz axis: 0, 200, 400, 600, 800, 1000, 1200, 1400, 1600, 1800, 2000

| Month	L1	L2	L3
Apr-02	100	0	30
May-02	250	100	30
Jun-02	1000	350	50
Jul-02	1500	500	50
Aug-02	2000	1000	50

Ronald Lipton

3

Integration Issues

- **New systems – new demands on DAQ, monitoring …**
  - **All systems talk to COOR, framework, db – heavy load on infrastructure will delay implementation and force priority decisions**
  - **Proper accounting – recording of rates by luminosity system, proper use of unbiased events needs to be tuned**
  - **Need fast turn-around testing of functionality – help from ID groups**
  - **New constraints on DAQ (L2 requires <u>all</u> inputs for all L1 accepts including SDAQ runs)**
  - **Tracking triggers are a whole new ballgame and will need extensive study**
  - **Initial implementations may be kludged with experts needed often – experiment live time may suffer**
  - **New DAQ rate capabilities will challenge algorithms and rejection**
- **In the next few months the "real" D0 should emerge – it will not be painless but it will be worth it.**
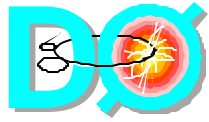
Summary
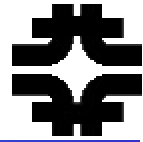
- **Workshop is being video streamed: http://www-visualmedia.fnal.gov/real/Dzero.htm**
  - **Use microphones for questions**
  - **Give me URLs of your talks (it is never too late)**
  - **Banquet -> Intimate dinner at Meson Sabika at 7:00 (link and map on the workshop agenda page). Let Leslie Groer know if you want to attend**
- **Discussion is encouraged, we will accommodate the schedule if necessary – this should be a workshop where issues are discussed.**

Cal L1 – Edmunds
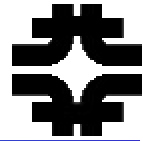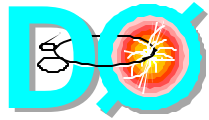
- **Basic Hardware to extend η coverage almost ready**
  - **CTFE card rework (SiDet) – 2-3 weeks**
    - add cables, replace components, remove PROMs
  - **PROM reprogramming**
    - Files ready (last week), verify and document this week, begin burning at SiDet, outside company
    - Verification and installation in CTFE's
  - **Installation in racks (during TeV studies) + testing, cabling, timing controls … ~2 weeks per rack pair ($\Delta\eta$~0.8)**
  - **Readout to L2, L3, verification, pulser testing – *recruiting help***
- **Priorities (discussed at workshop)**
  - **Extension of η vs large tiles**
  - **Use new CTFE hardware at η<0.8, correct low hadronic response?**
  - **When to implement missing Et (how much η is needed)**
- **My prejudice - *don't get distracted* - take fastest path to proper implementation**
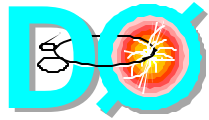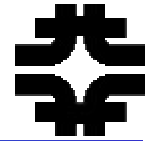
- **Goal – unprescaled triggers at all Run II luminosities**
  - **Use CTT to provide a sharp momentum cut**

- **Current dimuon trigger ok, single muon heavily rescaled**
  - **Triggering on scintillator roads only**
  - **Centroid cards not yet in trigger (ps, clock problems)**
  - **Firmware work in progress for improved roads, PDT, MDT wire triggers**
  - **Current trigger purity = "tight" μ triggers ~39% forward, ~7% central**

- **Major improvement will need CTT-μ track match. Allows Pt cut, remove prescales?**
  - **First customer of the CTT - hardware connection established**
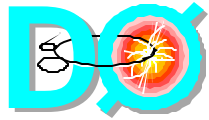
Summary
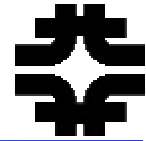
- **My brief summary does little justice to the volume of information presented**
  - **Most transparencies are on:**
    http://d0server1.fnal.gov/users/lipton/www/trigger/workshop_sched_v2.htm
  - **Streaming video archive:**
    http://vmsstreamer1.fnal.gov/VMS_Site_02/Lectures/DZeroTrigger2002/index.htm

- **Special thanks to Dugan O'Neil and Elizabeth Gallas for their tutorials on how to use the database and trigsim package**

- **D0 is on the verge of becoming the experiment envisaged when the Run II detector was designed. The next few months should see more than an order of magnitude increase in the capability of the D0 trigger and DAQ.**